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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/771,408	02/05/2004	Young-sun Chun	1793.1149	2370

21171 7590 03/04/2008

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EXAMINER	
MILIA, MARK R	

ART UNIT	PAPER NUMBER
2625	

MAIL DATE	DELIVERY MODE
03/04/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/771,408	CHUN, YOUNG-SUN	
	Examiner	Art Unit	
	MARK R. MILIA	2625	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-36 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-8,11-17 and 20-36 is/are rejected.

7)☒ Claim(s) 9,10,18 and 19 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 05 February 2004 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

2. Claims 1-4, 6-8, 11-13, 15-17, and 20-36 are rejected under 35 U.S.C. 102(a) as being anticipated by U.S. Patent No. 6,607,260 to Ikeda.

Regarding claim 1, Ikeda discloses a method of correcting image alignment errors in an ink-jet printer which has a printhead and performs a printing operation by ejecting ink from the printhead according to a variety of printing modes, the method comprising: printing a reference line, a first comparison line, and a second comparison line (see Figs. 1 and 8 and column 21 lines 16-34), calculating image alignment errors by measuring a first distance between the reference line and the first comparison line and a second distance between the reference line and the second comparison line (see Fig. 8 and column 22 lines 30-41, references refers to offset values which is analogous to the image alignment errors), and calculating a predetermined control value correcting the calculated image alignment errors, wherein the image alignment errors are corrected by controlling ink ejection using the calculated predetermined control value

(see column 22 lines 45-54, reference refers to a correction value which is analogous to the control value correcting the calculated image alignment errors).

Regarding claim 21, Ikeda discloses an apparatus for correcting image alignment errors in an ink-jet printer which has a printhead and performs a printing operation by ejecting ink from the printhead according to a variety of printing modes, the apparatus comprising: a printing instruction unit, which outputs an instruction signal to print a first reference line, a first comparison line, and a second comparison line (see Figs. 1, 7, and 8 and column 21 lines 16-34), a printing unit, which prints the reference line, the first comparison line, and the second comparison line in response to the instruction signal (see Figs. 1 and 8 and column 21 lines 16-34), an alignment error calculation unit, which calculates alignment errors by measuring a distance between the reference line and the first comparison line and a distance between the reference line and the second comparison line (see Fig. 8 and column 22 lines 30-41), and a control value calculation unit, which calculates a predetermined control value for correcting the calculated image alignment errors, wherein the image alignment errors are corrected by controlling ink ejection using the calculated predetermined control value (see column 22 lines 45-54).

Regarding claim 26, Ikeda discloses an image alignment error correcting method comprising: printing a reference line (see Figs. 1 and 8 and column 21 lines 16-34), printing a first comparison line a first predetermined distance from the printed reference line (see Figs. 1 and 8 and column 21 lines 16-34), printing a second comparison line a second predetermined distance from the printed reference line (see Figs. 1 and 8 and

column 21 lines 16-34), determining a first actual distance between the printed reference line and the printed first comparison line (see Fig. 8 and column 22 lines 30-41), determining a second actual distance between the printed reference line and the printed second comparison line (see Fig. 8 and column 22 lines 30-41), determining image alignment errors based upon a difference between the first predetermined distance and the first actual distance and a difference between the second predetermined distance and the second actual distance (see Fig. 8 and column 22 lines 30-41), and determining a correcting control value to correct for the image alignment error, based on the determined image alignment errors (see column 22 lines 45-54).

Regarding claim 32, Ikeda discloses an image alignment calibration device comprising: a printing unit (see Fig. 1), a controller to output signals to the printing unit to print a reference line at a first predetermined position, to print a first comparison line a first predetermined distance from the reference line and to print a second comparison line a second predetermined distance from the reference line in response to an image alignment correction request signal (see Figs. 1 and 8 and column 21 lines 16-34), a distance determiner to determine a first actual distance between the printed first comparison line and the printed reference line and a second actual distance between the printed second comparison line and the printed reference line (see Fig. 8 and column 22 lines 30-41), an error detector which outputs a first alignment error based on the difference between the first predetermined distance and the first actual distance and a second alignment error based on the difference between the second predetermined distance and the second actual distance (see Fig. 8 and column 22 lines 30-54), and a

control value calculator which calculates an image correcting control value based on the first alignment error and the second alignment error (see column 22 lines 45-54).

Regarding claim 36, Ikeda discloses an image alignment error correcting method comprising: determining image alignment errors based upon a difference between predetermined distances which correspond to spaces between three printed test marks and actual distances between the three test marks, respectively (see Fig. 8 and column 22 lines 30-41), and determining a correcting control value to automatically correct for the image alignment errors, based on the determined image alignment errors (see column 22 lines 45-54).

Regarding claim 2, Ikeda further discloses wherein the printing the reference line, the first comparison line, and the second comparison line comprises: printing a vertical reference line at a first position on a sheet of paper by a first control value used to control ink ejection according to a first printing mode (see Figs. 1 and 8 and column 21 lines 16-34), printing a first vertical comparison line at a second position on the sheet of paper separated from the vertical reference line printed at the first position by a first predetermined distance, by a second control value used to control ink ejection according to a second printing mode (see Figs. 1 and 8 and column 21 lines 16-34), and printing a second vertical comparison line at a third position on the sheet of paper separated from the vertical reference line printed at the first position by a second predetermined distance, by a third control value used to control ink ejection according to the second printing mode (see Figs. 1 and 8 and column 21 lines 16-34).

Regarding claim 3, Ikeda further discloses wherein the first vertical comparison line and the second vertical comparison line are printed in the same direction as or in a direction opposite to the direction of the vertical reference line (see Figs. 1 and 8 and column 21 lines 16-34).

Regarding claim 4, Ikeda further discloses wherein the first vertical comparison line and the second vertical comparison line are printed on one side of the vertical reference line (see Fig. 8).

Regarding claim 6, Ikeda further discloses wherein the calculating image alignment errors by measuring the first distance and the second distance comprises: measuring a first actual distance between the vertical reference line and the first vertical comparison line and a second actual distance between the vertical reference line and the second vertical comparison line (see Fig. 8 and column 22 lines 30-41), and obtaining a first alignment error on a horizontal axis by subtracting the first predetermined distance from the first actual distance and obtaining a second alignment error on the horizontal axis by-subtracting the second predetermined distance from the second actual distance (see column 22 lines 45-54).

Regarding claim 7, Ikeda further discloses wherein the measuring the first and second actual distances comprises: sensing the vertical reference line, the first vertical comparison line, and the second vertical comparison line and detecting corresponding times where the vertical reference line, the first vertical comparison line, and the second vertical comparison line are sensed (see column 21 line 37-column 22 line 54), and calculating the first actual distance by multiplying a time difference between the time

when the sensed vertical reference line is detected and the time when the first sensed vertical comparison line is detected, by a moving speed on the horizontal axis of the printhead, and calculating the second actual distance by multiplying a time difference between the time when the sensed vertical reference line is detected and the time when the second sensed vertical comparison line is detected, by the moving speed on the horizontal axis of the printhead (see column 22 lines 18-54).

Regarding claim 8, Ikeda further discloses wherein the calculating the predetermined control value comprises: obtaining a first straight line equation in which the second control value and the first alignment error on the horizontal axis are used as a first coordinate value and the third control value and the second alignment error on the horizontal axis are used as a second coordinate value (see column 22 lines 18-54), and obtaining the predetermined control value correcting alignment errors on the horizontal axis from the first straight line equation (see column 22 lines 18-54).

Regarding claim 11, Ikeda further discloses wherein the printing the reference line, the first comparison line, and the second comparison line comprises: printing a horizontal reference line at a fourth position on a sheet of paper by a fourth control value used to control ink ejection according to a third printing mode (see Fig. 10 and column 24 line 52-column 25 line 7), printing a first horizontal comparison line at a fifth position on the sheet of paper separated from the horizontal reference line printed at the fourth position by a third predetermined distance that is virtually set, by a fifth control value used to control ink ejection according to a fourth printing mode (see Fig. 10 and column 24 line 52-column 25 line 7), and printing a second horizontal comparison line at

a sixth position on the sheet of paper separated from the horizontal reference line printed at the fourth position by a fourth predetermined distance that is virtually set, by a sixth control value used to control ink ejection according to the fourth printing mode (see Fig. 10 and column 24 line 52-column 25 line 7).

Regarding claim 12, Ikeda further discloses wherein the first horizontal comparison line and the second horizontal comparison line are printed using a different printhead from a printhead for printing the horizontal reference line (see Fig. 10 and column 24 line 52-column 25 line 7).

Regarding claim 13, Ikeda further discloses wherein the first horizontal comparison line and the second horizontal comparison line are printed on one side of the horizontal reference line (see Fig. 10).

Regarding claim 15, Ikeda further discloses wherein the calculating image alignment errors by measuring the first distance and the second distance comprises: measuring a third actual distance between the horizontal reference line and the first horizontal comparison line and a fourth actual distance between the horizontal reference line and the second horizontal comparison line (see column 26 lines 10-20), and obtaining first alignment errors on a vertical axis by subtracting the third predetermined distance from the third actual distance and obtaining second alignment errors on the vertical axis by subtracting the fourth predetermined distance from the fourth actual distance (see column 26 lines 20-39).

Regarding claim 16, Ikeda further discloses wherein the measuring the third and fourth actual distances comprises: sensing the horizontal reference line, the first

horizontal comparison line, and the second horizontal comparison line and detecting corresponding times when the horizontal reference line, the first horizontal comparison line, and the second horizontal comparison line are sensed (see column 25 line 20-column 26 line 39), and calculating the third actual distance by multiplying a time difference between the time when the sensed horizontal reference line is detected and the time when the first sensed horizontal comparison line is detected, by a moving speed on the vertical axis of the printhead, and calculating the fourth actual distance by multiplying a time difference between the time when the sensed horizontal reference line is detected and the time when the second sensed horizontal comparison line is detected, by the moving speed on the vertical axis of the printhead (see column 25 line 58-column 26 line 39).

Regarding claim 17, Ikeda further discloses wherein the calculating the predetermined control value comprises: obtaining a second straight line equation in which the fifth control value and the first alignment error on the vertical axis are used as a third coordinate value and the sixth control value and the second alignment error on the vertical axis are used as a fourth coordinate value (see column 25 line 58-column 26 line 39), and obtaining the predetermined control value for correcting alignment errors on the vertical axis from the second straight line equation (see column 25 line 20-column 26 line 39).

Regarding claim 20, Ikeda further discloses wherein ink ejection is controlled by adjusting a starting point of the printhead, an ink dropping time or selection of nozzles of the printhead (see column 26 lines 20-39).

Regarding claim 22, Ikeda further discloses wherein the printing instruction unit comprises: a reference line printing instruction portion which outputs an instruction signal to print a vertical reference line at a first position on a sheet of paper in response to a first control value used to control ink ejection according to a first printing mode, or outputs the instruction signal to print a horizontal reference line at a fourth position on the sheet of paper in response to a fourth control value used to control ink ejection according to a third printing mode (see Figs. 1, 8, and 10, column 21 lines 16-34 and column 24 line 52-column 25 line 7), a first comparison line printing instruction portion which outputs a first comparison line printing instruction signal to print a first vertical comparison line at a second position on the sheet of paper separated from the vertical reference line printed at the first position by a first predetermined distance, in response to a second control value used to control ink ejection according to a second printing mode, or outputs the first comparison line printing instruction signal to print a first horizontal comparison line at a fifth position of the sheet of paper separated from the horizontal reference line printed at the fourth position by a third predetermined distance, in response to a fifth control value used to control ink ejection according to a fourth printing mode (see Figs. 1, 8, and 10, column 21 lines 16-34 and column 24 line 52-column 25 line 7) and a second comparison line printing instruction portion, which first comparison line printing to print a second vertical comparison line at the third position on the sheet of paper separated from the vertical reference line printed at the first position by a second predetermined distance that is virtually set, in response to a third control value used to control ink ejection according to the second printing mode, or

instructs to print a second horizontal comparison line at a sixth position of the sheet of paper separated from the horizontal reference line printed at the fourth position by a fourth predetermined distance that is virtually set, in response to a sixth control value used to control ink ejection according to the fourth printing mode and outputs an instruction result as a second comparison line printing instruction signal (see Figs. 1, 8, and 10, column 21 lines 16-34 and column 24 line 52-column 25 line 7).

Regarding claim 23, Ikeda further discloses wherein the alignment error calculation unit comprises: an actual distance measurement portion, which measures a first actual distance between the vertical reference line and the first vertical comparison line and a second actual distance between the vertical reference line and the second vertical comparison line, or measures a third actual distance between the horizontal reference line and the first horizontal comparison line and a fourth actual distance between the horizontal reference line and the fourth horizontal comparison line and outputs a measuring result as an actual distance measurement signal (see Fig. 8, column 22 lines 30-41 and column 26 lines 10-20), and an error detection portion, which obtains first alignment errors on the horizontal axis by subtracting the first predetermined distance from the first actual distance and obtains second alignment errors on the horizontal axis by subtracting the second predetermined distance from the second actual distance, or obtains first alignment errors on the vertical axis by subtracting the third predetermined distance from the third actual distance and obtains second alignment errors on the vertical axis by subtracting the fourth predetermined

distance from the fourth actual distance and outputs obtained alignment errors (see column 22 lines 45-54 and column 26 lines 20-39).

Regarding claim 24, Ikeda further discloses wherein the actual distance measurement unit comprises: an image sensing part, which senses the vertical reference line, the first vertical comparison line, the second vertical comparison line, the horizontal reference line, the first horizontal comparison line, and the second horizontal comparison line and outputs a corresponding sensing result (see column 21 line 37-column 22 line 54 and column 25 line 20-column 26 line 39), an image sensed time detection part, which detects sensing times of the corresponding sensing result of the image sensing part and outputs detected times (see column 21 line 37-column 22 line 54 and column 25 line 20-column 26 line 39), a moving speed detection part, which detects a moving speed on a horizontal axis or a vertical axis of the printhead and outputs the detected moving speed (see column 21 line 37-column 22 line 54 and column 25 line 20-column 26 line 39), and a distance calculation part, which calculates the first actual distance by multiplying a time difference between a time when the sensed vertical reference line is detected and a time when the first sensed vertical comparison line is detected, by the detected moving speed on the horizontal axis, and calculates the second actual distance by multiplying a time difference between a time when the sensed vertical reference line is detected and a time when the second sensed vertical comparison line is detected, by the detected moving speed on the horizontal axis, or calculates the third actual distance by multiplying a time difference between a time when the sensed horizontal reference line is detected and a time when the first

sensed horizontal comparison line is detected, by the detected moving speed on the vertical axis, and calculates the fourth actual distance by multiplying a time difference between a time when the sensed horizontal reference line is detected and a time when the second sensed horizontal comparison line is detected, by the detected moving speed on the vertical axis and outputs a calculation result (see column 22 lines 18-54 and column 25 line 58-column 26 line 39).

Regarding claim 25, Ikeda further discloses wherein the control value calculation unit comprises: a straight line equation calculation portion, which obtains a first straight line equation in which the second control value and first alignment error on the horizontal axis are used as a first coordinate value and the third control value and second alignment error on the horizontal axis are used as a second coordinate value, or obtains a second straight line equation in which the fifth control value and first alignment error on a vertical axis are used as a third coordinate value and the sixth control value and second alignment error on the vertical axis are used as a fourth coordinate value (see column 22 lines 18-54 and column 25 line 58-column 26 line 39), and a control value calculation portion, which obtains a predetermined control value correcting alignment errors on the horizontal axis from the first straight line equation, or obtains a predetermined control value correcting alignment errors on the vertical axis from the second straight line equation, and outputs an obtained predetermined control value (see column 22 lines 18-54 and column 25 line 58-column 26 line 39).

Regarding claims 27 and 33, Ikeda further discloses wherein the reference line, the first comparison line, and the second comparison line are vertically oriented (see Figs. 1 and 8 and column 21 lines 16-34).

Regarding claims 28 and 34, Ikeda further discloses wherein the reference line, the first comparison line, and the second comparison line are horizontally oriented (see Fig. 10 and column 24 line 52-column 25 line 7)

Regarding claims 29 and 35, Ikeda further discloses wherein only one reference line, one first comparison line and one second comparison line are printed (see Figs. 8 and 10).

Regarding claim 30, Ikeda further discloses wherein the determining the first actual distance between the printed reference line and the printed first comparison line comprises: determining a time difference of a printhead moving at a predetermined speed between the printed first comparison line and the printed reference line, calculating the first actual distance based on the predetermined moving speed and the time difference (see Fig. 8, column 22 lines 30-41 and column 21 line 37-column 22 line 54).

Regarding claim 31, Ikeda further discloses wherein the determining the second actual distance between the printed reference line and the printed second comparison line comprises: determining a time difference of a printhead moving at a predetermined speed between the printed second comparison line and the printed reference line and calculating the second actual distance based on the predetermined moving speed and

the time difference (see Fig. 8, column 22 lines 30-41 and column 21 line 37-column 22 line 54).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 5 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ikeda.

Regarding claim 5, Ikeda discloses printing vertical comparison lines in theoretical predetermined positions (see column 21 lines 27-34).

Ikeda does not disclose expressly wherein the first vertical comparison line and the second vertical comparison line are printed on both sides of the vertical reference line.

Regarding claim 14, Ikeda discloses printing horizontal comparison lines in theoretical predetermined positions (see column 25 lines 3-8).

Ikeda does not disclose expressly wherein the first horizontal comparison line and the second horizontal comparison line are printed on both sides of the vertical reference line.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to print vertical or horizontal comparison lines on both sides of a vertical or horizontal reference line because Ikeda acknowledges that the position on the comparison lines is theoretical and Ikeda also discloses an alignment error correction system based on sensing printed images (lines) in a main and subscanning direction based on the position of a reference image (line). Therefore it is not important that the comparison images (lines) be only on one side of the reference image (line).

Thus, it would have been obvious to combine to modify Ikeda to obtain the invention as specified in claims 5 and 14.

Allowable Subject Matter

4. Claims 9, 10, 18, and 19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The prior art of record does not disclose, teach, or suggest the claimed limitations of (in combination with all other limitations in the claims), wherein, the first straight line equation is obtained using the following Equation: $y = (y2 - y1)(x - x1)/(x2 - x1) + y1 = (y2 - y1)(x - x2)/(x2 - x1) + y2$ where x is the predetermined control value, y are alignment errors on the horizontal axis according to a variation of the predetermined control value, xl is the second control value, x2 is the third control value, y1 is the first alignment error on the horizontal axis, and 12 is the second alignment error on the

horizontal axis and wherein x, corresponding to the predetermined control value when y equals 0 so that the alignment errors on the horizontal axis do not occur, is obtained using the following Equation: x = (x1 * y2 - x2 * y1)/(y2 – y1), as set forth in claim(s) 9 and 10 and wherein the second straight line equation is obtained using the following Equation: y = (y4 - y3)(x - x3)/(x4 - x3) + y3 = (y4 - y3)(x - x4)/(x4 - x3) + y4 where x is the predetermined control value, y are alignment errors on the vertical axis according to a variation of the predetermined control value, x3 is the fifth control value, x4 is the sixth control value, y3 is the first alignment error on the vertical axis, and y4 is the second alignment error on the vertical axis and wherein x, corresponding to the predetermined control value when y equals 0 so that the alignment errors on the vertical axis do not occur, is obtained using the following Equation: x = (x3 * y, - x4 * y3)/(y4 - y3), as set forth in claim(s) 18 and 19.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. To further show the state of the art please refer to the attached Notice of references Cited.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark R. Milia whose telephone number is (571)272-7408. The examiner can normally be reached M-F 8:00am-4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Moore can be reached at (571) 272-7437. The fax number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Mark R. Milia
Examiner
Art Unit 2625

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